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A Survey of the Ants (Hymenoptera: Formicidae) of the Volcanic Caldera of Mt. Melibengoy, Mindanao Island, Philippines

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ABSTRACT

The ants of the volcanic caldera of Mt. Melibengoy in the Allah Valley Watershed Forest Reserve (AVWFR), are surveyed, principally by opportunistic collecting. We report 87 ant species representing 33 genera in six subfamilies. We also report three new species records for the Philippines in addition to 13 new distributional records for Mindanao Island. The new Philippine species records are: *Cataulacus granulatus* (Latreille, 1802); *Myrmecina yamanei* Okido, Ogata and Hosoishi, 2016; and *Pheidole quadrensis* Forel, 1900. The new Mindanao distributional records are *Camponotus nigricans* Roger, 1863; *Camponotus variegatus crassinodis* Forel, 1892; *Crematogaster subcircularis* Mayr, 1879; *Parasyscia rufithorax* (Wheeler & Chapman, 1925); *Pheidole cariniceps* Eguchi, 2001; Ph. *hortensis* Forel, 1913; *Ph. spinicornis* Eguchi, 2001; *Polyrhachis dives* F. Smith, 1857; *Po. illaudata* Walker, 1859; *Po. rastellata* (Latreille, 1802); *Po. thrinax* Roger, 1863; *Proceratium papuanum* Emery, 1897; and *Strumigenys theia* Bolton, 2000. The high diversity of ants detected by opportunistic hand collecting suggests that a more intensive survey, using a variety of collecting techniques, will very likely discover more new species and new distributional records from Mt. Melibengoy. The very diverse native ant community also provides as basis for the high conservation priority of the AVWFR. The knowledge gap of Mindanao ant diversity and its affinity to Bornean ant diversity are briefly discussed.

***Keywords**:* Ant diversity, Lake Holon, new records, South Cotabato

INTRODUCTION

The Philippines is a large archipelago of more than 7,600 islands of various sizes, topography, geologic origin, and degrees of human habitation and disturbance (National Mapping and Resource Information Authority [NAMRIA], 2022). Four of the largest islands, namely, Luzon (109,964.9 sq. km.: 326 ant species known), Mindanao (97,530 sq. km.: 216 ant species known), Negros (13,74.5 sq. km.: 139 ant species known), and Palawan (12,188.6 sq. km.: 129 ant species known) are the best explored yet many mountains and natural habitats on these islands have never been surveyed for ants (General & Alpert, 2012; United Nations Environment Programme [UNEP], 2013; DEMG, unpublished notes). Other major islands such as Samar (12,849.4 sq. km.), Mindoro (10,571.8 sq. km.), and Leyte (7,367.6 sq. km.) are still very poorly explored. Literally thousands of islands and mountains, even those that are inhabited, remain unexplored for ants.

The history of the study of Philippine ant diversity and taxonomy can be summarized into several "periods of activity". The earliest period involved the description by American and European myrmecologists of ants collected by explorers and professional collectors. The study of Philippine ants dates back at least to the early 1890s, when Carlo Emery described some ant species collected by M. E. Simon (Emery, 1893c). Many ant species described by Frederick Smith from Borneo and Indonesia were also found in the Philippines (Smith, 1857, 1858, 1860, 1861, 1865). However, research efforts had always been sporadic. There was no expedition dedicated to the exploration of Philippine ant diversity, although Wheeler compiled a list of 71 Philippine species (Wheeler ,1909). In the 1910's, James W. Chapman, a tenured professor and myrmecologist at Harvard University, came to teach in Dumaguete in the central island of Negros. The arrival of Chapman in the 1910s was the beginning of decades of ant collecting from throughout the country, but principally from Mt. Cuernos de Negros, right beside Dumaguete City (Antwiki, 2022a; Wheeler & Chapman, 1925). Chapman's work was interrupted by the Second World War when he and his family were captured on the mountain and incarcerated for 18 months in the University of Santo Tomas internment camp (AntWiki, 2022a). He never fully recovered from the hardship of incarceration, as evidenced by his shaky handwritten labels (DEMG, unpublished notes). Chapman collected thousands of specimens which are mostly housed in the Ant Collection of the Harvard University Museum of Comparative Zoology. After the Chapman period, there was a relative lull of several decades, when again foreign myrmecologists occasionally described Philippine species. During this lull, only a few journal articles were published about Philippine ants, such as Chapman (1963) and Calilung (2000). Calilung (2000) proposed a new genus with one new species and one new subspecies of a different genus. Only the new species, *Tetramorium manobo* (Calilung, 2000; survived a subsequent taxonomic review (Bolton, 2003; Schlick-Steiner, Steiner & Zettel, 2006). In 2003, marking the beginning of the current period of systematic ant collecting in the country, Dr. Gary D. Alpert visited and conducted the first transect study of the ants of Mt. Isarog, where he applied, for the first time in the country, quantitative methods of collection. From that collection event, General and Alpert (2012) reported 10 new genus records in the country. Most previous collections had been opportunistic, with the usual aim of simply collecting ants, exemplified by the many student collections of Mt. Makiling, now housed in the Entomological Collection of the Museum of Natural History of the University of the Philippines Los Baños. A notable exception to the opportunistic collection is Brown (1957), where he described two new species from interceptions by the U.S. Plant Quarantine

from plants that arrived in Honolulu, Hawaii, U.S.A. from the Philippines. The current period of modern transect studies, using a suite of collecting methods and equipment (Agosti et al., 2000) has now placed ant diversity technology on a par with the rest of the myrmecological world. It has become possible to collect several dozen to hundreds of ant species from a single 100-m transect (General & Buenavente, 2017: 122 species collected; General, Buenavente, & Rodriguez, 2020: 83 species collected; General, 2021: 75 species collected). In all the transect studies conducted so far, species new to science have been discovered and are currently being taxonomically described.

Some of the recent articles on Philippine ants include a synoptic review of the ant genera of the Philippines (General & Alpert, 2012) and a taxonomic description of a new endemic ant genus (General, 2015).

New Philippine species belonging to the following ant genera were described recently: *Aretidris* (General, 2015); *Calyptomyrmex* (Shattuck, 2011); *Camponotus* (Zettel et al., 2018; [in the former *Forelophilus*] Zettel & Zimmerman, 2007); *Cardiocondyla* (Seifert & Frohschammer, 2013); *Carebara* (Fernandez, 2010); *Crematogaster* (Hosoishi & Ogata, 2016); *Diacamma* (Laciny et al., 2015; Zettel et al., 2016); *Dilobocondyla* (Zettel & Bruckner, 2013); *Echinopla* (Zettel & Laciny, 2015); *Harpegnathos* (General, 2016); *Lordomyrma* (Taylor, 2012); *Myrmecina* (Okido et al., 2020); *Myrmicaria* (Zettel et al., 2018); *Myrmoteras* (Zettel & Sorger, 2011); *Odontomachus* (General, 2018; Sorger & Zettel 2011); *Polyrhachis* (Kohout, 2006, 2013; Sorger & Zettel, 2009, 2010; Zettel, 2013); *Pristomyrmex* (Wang, 2003; Zettel, 2006, 2007; Zettel & Laciny, 2015); *Recurvidris* (Zettel, 2008); *Romblonella* (General & Buenavente, 2015); *Stictoponera* (formerly *Gnamptogenys*) (Lattke, 2004); *Strumigenys* (Bolton, 2000); *Tetheamyrma* (General & Buenavente, 2018); *Tetramorium* (Calilung, 2000); *Tetraponera* (Ward, 2001); and *Vombisidris* (General, 2020; Zettel & Sorger, 2010). Many species of *Pheidole* described by Katsuyuki Eguchi from Borneo in 2001 are also found in the Philippines (Eguchi, 2001; DEMG, unpublished notes).

Ants have been surveyed in the Philippines when opportunity and resources became available. On the main island of Luzon, General et al. (2020) conducted a transect study on Mt. Isarog in the Bicol Peninsula, collecting both diurnal and nocturnal ants, and found a distinct community of nocturnal arboreal ants, including at least one new species, *Vombisidris freyae* General, 2020.

On the other main island of Mindanao, only two systematic transect surveys have been published, although there are several unpublished surveys (PACB, unpublished notes).

General & Buenavente (2017) conducted a transect survey of a World Heritage Site, Mt. Hamiguitan in Davao Oriental Province (see approximate

location in Fig. 1a), and found 122 species representing 55 genera, with 14 new Philippine records of species, including some potentially new species. In Bukidnon Province, General (2021) conducted a transect study of a remote disturbed forest in a conflict zone (see approximate location in Figure 1a) and discovered nine new species distributional records for the country.

The distribution and diversity of ants in the Philippines remain poorly understood. Any effort or study to survey the ants of the archipelago, particularly in unexplored areas but especially in conflict areas, will add significantly to our understanding of the diversity and distribution of ants in the Philippine archipelago.

The Municipality of T'boli, Province of South Cotabato, where Mt. Melibengoy and its crater lake, Lake Holon, is located, is part of the Allah Valley Watershed Forest Reserve (AVWFR) which is considered a conservation priority site in the country. Lake Holon is an important ecotourism site that provides income to the nearby indigenous communities. Recently, the Sultan Kudarat State University conducted biodiversity assessment of beetles of Lake Holon (Cabras, et al., 2022; Medina et al., 2023; Pajota et al., 2022; Patalita et al., 2022; Pepito et al., 2020).

OBJECTIVE OF THE STUDY

The objective of this study was to document the ants of Mt. Melibengoy and its crater lake, Lake Holon. The ant diversity of Mt. Melibengoy has never been surveyed. Therefore, all ant records of this study are new distributional records for Mt. Melibengoy. This latest contribution provides a look at the ant diversity of the volcanic caldera of Mt. Melibengoy, a poorly surveyed mountain in southern Mindanao Island.

MATERIALS AND METHODS

Lake Holon is located in the caldera of Mt. Melibengoy (formerly known as Mt. Parker), an inactive volcano with an elevation of 1, 280 m above sea level (masl), in the southern portion of central Mindanao Island (Figure 1a). The lake is bounded by steep slopes of loose, unstable volcanic rocks and boulders, severely restricting access by only two challenging trails namely the Kule and Salacafe trails (Figure 1b). The sampling of ants was conducted, mainly by Nonesa G. Ali, with the assistance of Joelyn D. Mamon and supervision by David Emmanuel M. General and Rizalyn B. Cudera, in September 2019, October 2019, March 2020, November 2020, February 2021, April 2021, and October 2021.

Ants were collected principally by opportunistic collecting along the established semi-permanent trails leading to Lake Holon. Specimens were collected from 3 sampling sites.

Sampling site 1 was the semipermanent Salacafe trail, roughly 9 km long, stretching from the Barangay (village) Salacafe tourist reception area to Lake Holon base camp. The trail is largely open, with the lower sections having been transformed into farmland.

Sampling site 2 was the base camp in a grassy field at the shore of Lake Holon. The vegetation around the camp was an unidentified spreading mat-forming grass and disturbed secondary forest (Figure 1c).

Sampling site 3 was the outlet of the lake. The site was surrounded by secondary forest.

Quantitative methods of collection, such as pitfall trapping and leaf litter sifting, were attempted but were abandoned because of the difficulty of the terrain, instability of the slope surface (Figure 1b), and the paucity of the leaf litter. Specimens were preserved in 70% EtOH and representative samples were dry-mounted on card triangles.

Dry mounted specimens were examined with a Leica 26D stereomicroscope. The specimens were identified to genus, using the following keys: Bolton (1991); Borowiec (2016); General & Alpert (2012); Schmidt & Shattuck (2014); and Shattuck (1992). Then the species were determined using the appropriate genus keys: *Aenictus* (Jaitrong & Yamane 2011, 2012); *Cataulacus* (Bolton, 1974); *Euprenolepis* (LaPolla, 2009); *Myrmecina* (Okido et al., 2020); *Myrmicaria* (Zettel et al. 2018); *Odontomachus* (Sorger & Zettel, 2011); *Parasyscia* (as *Cerapachys*, Brown, 1975); *Pheidole* (Eguchi 2001); *Polyrhachis* (Kohout, 2006, 2013, 2014); *Strumigenys* (Bolton, 2000); *Technomyrmex* (Bolton, 2007); and *Tetramorium* (Bolton, 1976, 1977). We also used the keys available online (Antwiki, 2022b-g).

Specimens of new Philippine and Mindanao distributional records have been deposited at the Natural History Museum of the National Museum of the Philippines (PNM). A reference collection has been established in Sultan Kudarat State University.

Representative specimens of new Philippine distributional records of species were imaged. Images were created by Perry Archival C. Buenavente, using a Leica MC120HD digital camera attached to a Leica S8APO stereomicroscope. These images were stacked using Combine ZM. The stacked images were edited with Adobe Photoshop CS5. The map was created in QGIS 3.14 (2021), using geographic information system data from Philippine Geographic Information System Data Clearinghouse [PhilGIS], 2021.

Figure 1

Location of study site

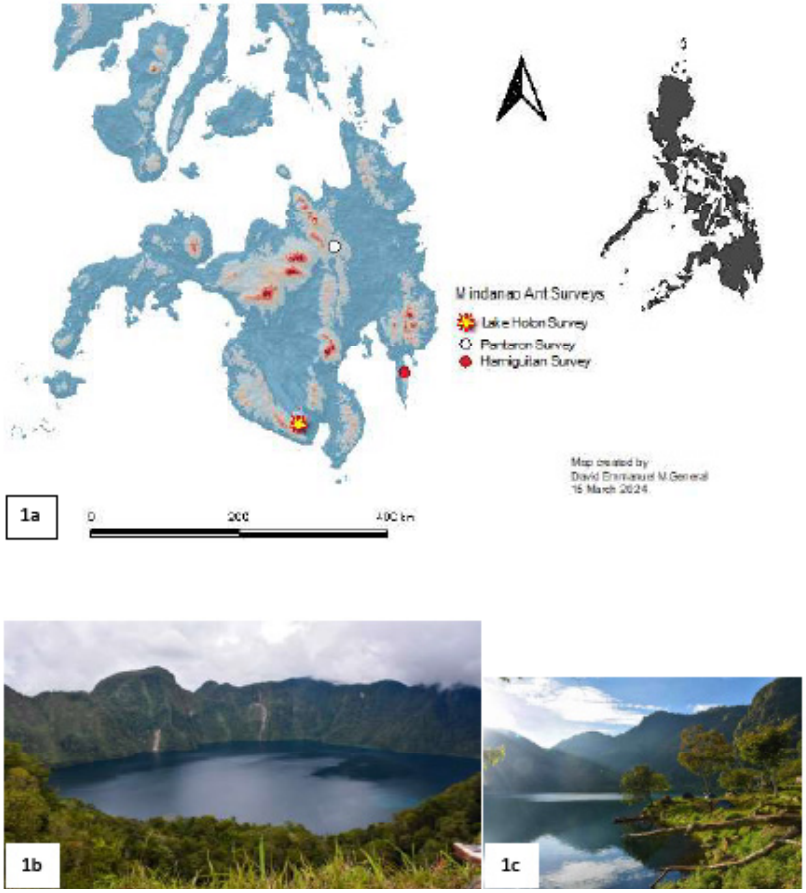


Figure 1a shows the map of ant surveys conducted on Mindanao Island, Philippines. Gold star indicates the approximate location of an opportunistic sampling study around Lake Holon, Mt. Melibengoy, Municipality of T'boli, South Cotabato Province (this contribution). White circle indicates the approximate location of a transect study on Pantaron Range, Bukidnon Province (General, 2021). Red circle indicates the approximate location of a transect study on Mt. Hamiguitan, Davao Oriental Province (General & Buenavente, 2017). False colors indicate elevation, where blues are lower in elevation while reds are

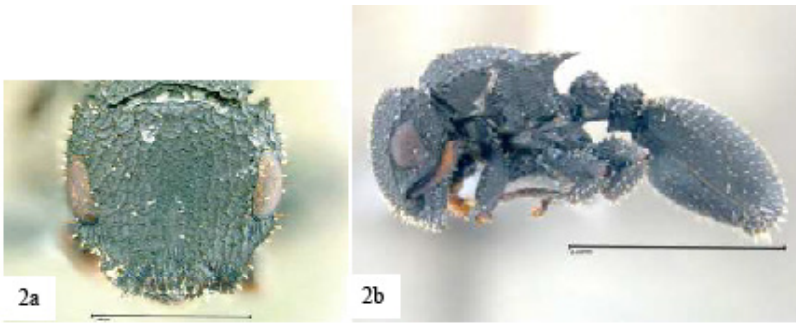
higher. View of the volcanic caldera, including Lake Holon, from an overlook. Light-colored gashes indicate recent landslides (Figure 1b). Grassy campsite is at the shore of Lake Holon (Figure 1b). Field images were done by Joelyn D. Mamon.

RESULTS AND DISCUSSION

A total of 87 ant species were collected from three sites around Lake Holon. Three species are new Philippine distributional records, namely: *Cataulacus granulatus* (Latreille, 1802); *Myrmecina yamanei* Okido, Ogata & Hosoishi, 2021; and *Pheidole quadrensis* Forel, 1900 (Figures 2-4). Thirteen species are new distributional records for the island of Mindanao: *Camponotus nigricans* Roger, 1863; *Camponotus variegatus* crassinodis Forel, 1892; *Crematogaster subcircularis* Mayr, 1879; *Parasyscia rufithorax* (Wheeler & Chapman, 1925); *Pheidole cariniceps* Eguchi, 2001; *Ph. hortensis* Forel, 1913; *Ph. spinicornis* Eguchi, 2001; *Polyrhachis dives* F. Smith, 1857; *Po. illaudata* Walker, 1859; *Po. rastellata* (Latreille, 1802); *Po. thrinax* Roger, 1863; *Proceratium papuanum* Emery, 1897; and *Strumigenys theia* Bolton, 2000. Table 1 summarizes and arranges the species alphabetically by subfamily.

Figures 2-4

New Philippine distributional records of species from Lake Holon, Mt. Melibengoy, Municipality of T'boli, South Cotabato Province, Mindanao Island, Philippines. 2a, 2b: Cataulacus granulatus *(Latreille, 1802), full-face and lateral view; 3a, 3b:* Myrmecina yamanei *Okido, Ogata & Hosoishi, 2016, full-face and lateral view; 4a, 4b:* Pheidole quadrensis *Forel, 1900, full-face and lateral view. Images by Perry Archival C. Buenavente*



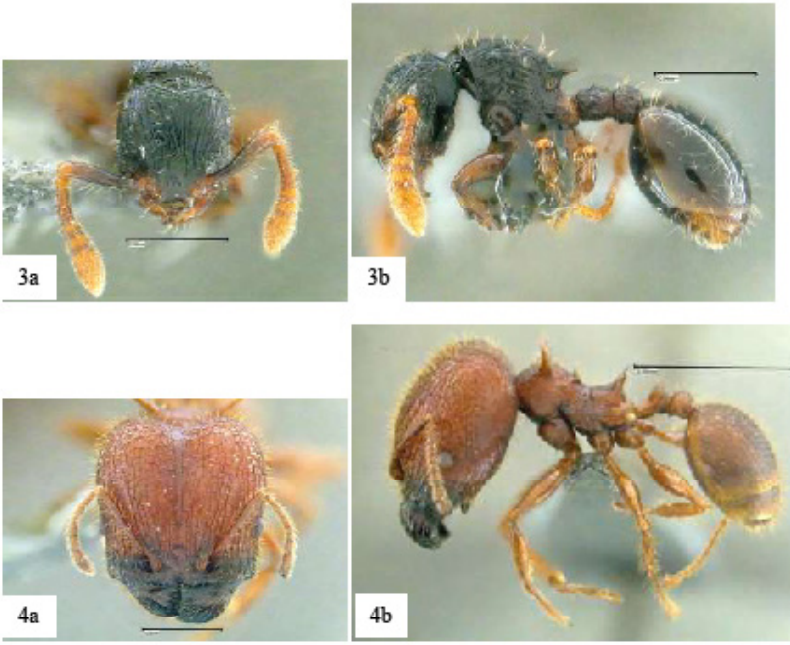


Table 1

*List of ant species, identified based on the indicated subcaste, collected at Lake Holon, Mt. Melibengoy, T'boli, South Cotabato Province, Mindanao Island, Philippines. Species names in boldface represent new Philippine distributional records of species. Species names marked with * represent new distributional records for the island of Mindanao*

Species	Subcaste
Subfamily Dolichoderinae	
Dolichoderus thoracicus (F. Smith, 1860: 69)	worker
Dolichoderus undetermined species 1	worker
Iridomyrmex anceps (Roger, 1863: 164)	worker
Technomyrmex sundaicus (Emery, 1900: 695)	worker
Subfamily Dorylinae	
Aenictus gracilis Emery, 1893b: 187	worker

Table 1 continued

Species	Subcaste
Aenictus laeviceps F. Smith, 1857: 79	worker
Aenictus nesiotis Wheeler & Chapman, 1930	
in Wheeler W. M. 1930: 208	worker
Aenictus undetermined species 1	male alate
*Parasyscia rufithorax** Wheeler & Chapman, 1925: 50	worker
Subfamily Formicinae	
Anoplolepis gracilipes (F. Smith, 1857: 55)	worker
Camponotus irritans pallidus (F. Smith, 1857: 57)	worker
*Camponotus nigricans** Roger, 1863: 140	worker
Camponotus pressipes Emery, 1893c: 268	worker
*Camponotus variegatus crassinodis** Forel, 1892: 230	worker
Camponotus undetermined species 1	worker
Camponotus undetermined species 2	female alate
Camponotus undetermined species 3	worker
Camponotus undetermined species 4	worker
Camponotus undetermined species 5	worker
Camponotus undetermined species 6	worker
Camponotus undetermined species 7	worker
Camponotus undetermined species 8	worker
Camponotus undetermined species 9	queen
Camponotus undetermined species 10	worker
Camponotus undetermined species 11	male alate
Colobopsis corallina Roger, 1863: 159	worker
Colobopsis leonardi (Emery, 1889: 515)	worker
Colobopsis undetermined species 1	female alate
Colobopsis undetermined species 2	female alate
Colobopsis undetermined species 3	worker

Table 1 continued

Species	Subcaste
Euprenolepis procera (Emery, 1900: 699)	worker
Nylanderia undetermined species 1	worker
Nylanderia undetermined species 2	worker
Nylanderia undetermined species 3	male alate
Paraparatrechina iridescens (Donisthorpe, 1942: 71)	worker
Polyrhachis aequalis Forel, 1910: 129	worker
Polyrhachis armata (Le Guillou, 1842: 313)	worker
*Polyrhachis dives** F. Smith, 1857: 64	worker
*Polyrhachis illaudata** Walker, 1859: 373	worker
Polyrhachis mindanaensis Emery, 1923: 62	worker
*Polyrhachis rastellata** (Latreille, 1802: 130)	worker
Polyrhachis semiinermis Donisthorpe, 1941: 209	worker
Polyrhachis thrinax Roger, 1863: 152	worker
Polyrhachis villipes F. Smith, 1857: 61	worker
Polyrhachis zopyra F. Smith, 1861:	worker
Pseudolasius undetermined species 1	worker
Subfamily Myrmicinae	
Carebara diversa (Jerdon, 1851: 109)	worker
Carebara maccus Wheeler, 1929: 52	worker
Cataulacus granulatus (Latreille, 1802: 275)	worker
Crematogaster crassicornis Emery, 1893c: 265	worker
*Crematogaster subcircularis** Mayr, 1879: 685	worker
Crematogaster undetermined species 1	female alate
Myrmecina grandis Okido, Okada & Shingo, 2020: 46	worker
Myrmecina undetermined species 1	worker
Myrmecina yamanei Okido, Okada & Shingo, 2020: 103	worker
Myrmicaria aphidicola Calilung, 2000: 68	worker

Table 1 continued

Species	Subcaste
Pheidole aglae Forel, 1913: 32	worker
*Pheidole cariniceps** Eguchi, 2001: 41	worker
Pheidole fervens F. Smith, 1858: 176	worker
*Pheidole hortensis** Forel, 1913: 38	worker
Pheidole quadrensis Forel, 1900: 25	worker
Pheidole quadricuspis Emery 1900: 683	worker
Pheidole rabo Forel, 1913: 28	worker
Pheidole singaporensis Özdikmen, 2010: 804	worker
*Pheidole spinicornis** Eguchi, 2001: 116	worker
Pheidole undetermined species 1	female alate
Solenopsis undetermined species 1	worker
*Strumigenys theia** Bolton, 2000: 407	worker
Tetramorium aspersum (F. Smith, 1865: 72)	worker
Tetramorium insolens (F. Smith, 1861: 47)	worker
Tetramorium khnum Bolton, 1977: 122	worker
Tetramorium pacificum Mayr, 1870: 976	worker
Vollenhovia ambitiosa Menozzi, 1925: 446	worker
Vollenhovia undetermined species 1	male alate
Subfamily Ponerinae	
Brachyponera obscurans (Walker, 1859: 372)	worker
Cryptopone testacea Emery, 1893a: cclxxv	worker
Diacamma symposium Zettel, Pal & Laciny, 2016: 152	worker
Ectomomyrmex undetermined species 1	worker
Hypoponera undetermined species 1	worker
Leptogenys diminuta (F. Smith, 1857: 69)	worker
Leptogenys peuqueti (Andre, 1887: 292)	worker
Myopias undetermined species 1	worker

Table 1 continued

Species	Subcaste
Odontomachus rixosus F. Smith, 1857: 64	worker
Odontomachus simillimus F. Smith, 1858: 80	worker
Odontomachus undetermined species 1	worker
Odontoponera denticulata (F. Smith, 1858: 90)	worker
Subfamily Proceratiinae	
*Proceratium papuanum** Emery, 1897: 592	worker

Mount Melibengoy is a poorly surveyed mountain ecosystem of the Allah Valley Watershed Forest Reserve (AVWFR) on Mindanao Island, itself largely unexplored for insect and invertebrate biodiversity.

"We cannot protect something we do not love, we cannot love what we do not know, and we cannot know what we do not see. And touch. And hear." (Louv, 2012). This statement explains why protected natural areas continue to be damaged by desctructive human activities. One step forward in improving the protection of natural areas is determining what plants and animals, particularly native or even endemic species, reside in these areas.

Wildlife conservation is informed by biodiversity surveys of protected habitats, which may be remote or within conflict zones. Surveys by local students provide information and specimens from these difficult areas, which are usually inaccessible to nonresidents. In this study, only the senior author is a non-resident of the unstable southwestern corner of Mindanao Island. Non-Filipino researchers would be discouraged by their local counterparts because the safety risk is unacceptably high.

Kass et al. (2022) predict that southwestern Mindanao, among other unexplored areas in the Philippines, can be a potential center of ant species richness with the appropriate amount of effort and sampling. Our survey results seem to corroborate this prediction. There are several possibly new species in the current collection.

The ant community of the protected landscape of Lake Holon has a very high proportion of native ant species. Our results show that the natural areas of Mt. Melibengoy and Lake Holon are relatively healthy, suggesting that the area is not heavily disturbed by ecotourism activities.

Lake Holon, despite being officially classified as a protected landscape, is a

famous tourist destination in the Philippines. The economic value of the tourism services of Lake Holon is estimated to be around PhP 224 million annually (Villa et al. 2016). Tourism poses a threat to the biodiversity of Lake Holon, because the trails and base camps are constantly cleared. The maintenance of semipermanent trails and camp sites affects the native flora and fauna, such as the ants extant in the area. In this sense, the difficult terrain and loose rocky substrate protect the native fauna and flora from human disturbance (Figure 1b).

Aside from their role as ecosystem engineers, ants are also considered important indicator species to monitor conservation and management practices (Wills & Landis, 2018). Ants can be used in monitoring the level of disturbance of the area, especially since habitat destruction is a constant threat in Lake Holon. Crist (2009) found that habitat fragmentation mediated by human activities decreased native ant species diversity. This loss of ant diversity affected wider areas due to the disruption of functional roles. A higher conservation priority for Lake Holon is imperative because of the high risk of forest disturbance and fragmentation of Mt. Melibengoy.

Only two systematic ant surveys on the large island of Mindanao have been published (General & Buenavente, 2017; General, 2021), although several remain unpublished (PACB, unpublished notes). Figure 1a shows the approximate geographic locations and the large distances between the previous study sites and this current study. The map clearly shows that there are entire mountain ranges that remain unexplored for ants. The current contribution, together with the two previous studies, provide just a glimpse of the ant diversity on Mindanao. This glimpse suggests a degree of affinity of Mindanao ant fauna with Bornean and fauna. Twenty species described from Borneo are also found in Mindanao (AntWiki, 2024; DEMG, unpublished notes) (Table 2). It is possible that many more Bornean ant species may be found on Mindanao.

Table 2

List of ant species described from Borneo that are also found on Mindanao Island (AntWiki, 2024; DEMG, unpublished notes)

1	*Aenictus gracilis* Emery, 1893b: 187
2	*Camponotus (Tanaemyrmex) irritans pallidus* (F. Smith, 1857: 57)
3	*Camponotus (Myrmamblys) leucodiscus* Wheeler, 1919: 117-118
4	*Camponotus (Myrmotarsus) pressipes* Emery, 1893c: 268 (footnote)

Table 2 continued

5	*Crematogaster subcircularis* Mayr, 1879: 685
6	*Diacamma rugosum* (Le Guillou, 1842: 318)
7	*Echinopla pallipes* F. Smith, 1857: 80
8	*Paratopula ankistra* Bolton, 1988: 134
9	*Pheidole annexa* Eguchi, 2001: 32
10	*Pheidole cariniceps* Eguchi, 2001: 41
11	*Pheidole clypeocornis* Eguchi, 2001: 44
12	*Pheidole deltea* Eguchi, 2001: 47
13	*Pheidole kikutai* Eguchi, 2001: 67
14	*Pheidole planidorsum* Eguchi, 2001: 91
15	*Pheidole retivertex* Eguchi, 2001: 104
16	*Pheidole sayapensis* Eguchi, 2001: 114
17	*Pheidole spinicornis* Eguchi, 2001: 116
18	*Pheidole tenebricosa* Eguchi, 2001: 121
19	*Polyrhachis (Polyrhachis) montana* Hung, 1970: 23
20	*Strumigenys theia* Bolton, 2000: 407

CONCLUSIONS

Ant research on Mindanao is still nascent. The current knowledge of the diversity and distribution of ants on Mindanao is quite fragmentary. The geographical distances between sites that have been systematically and authoritatively surveyed are too large for any speculation of distributional patterns. Much field work still needs to be done to elucidate the ant diversity of such a large island. It is hoped that this paper would encourage other students and researchers to survey the ants of Mindanao Island.

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